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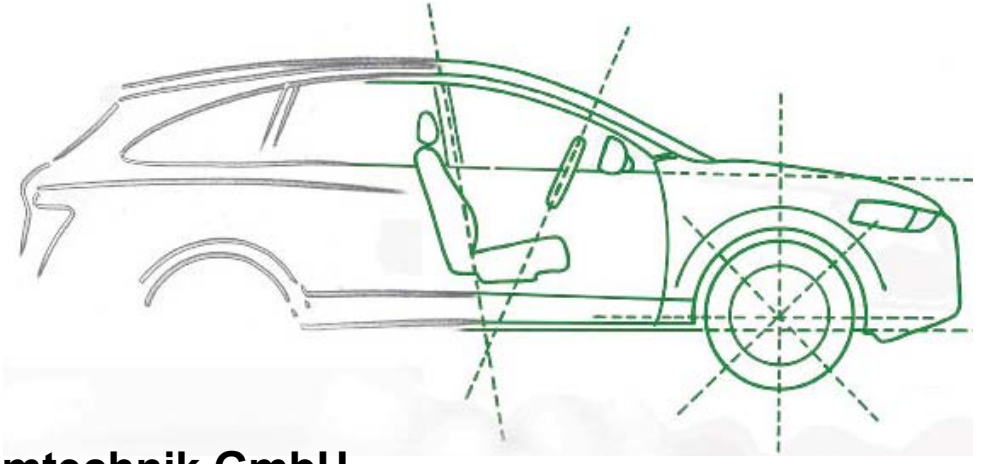
optimizing your development

Fault memory tests using HiL Test Systems and Parameterization with ASAM ODX



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automotive testing expo 2007 europe

ASAM

DI/AH, 08.05.2007

Agenda

- Berner & Mattner Systemtechnik
- Hardware in the Loop (HiL)
- HiL Testsystem for DTC testing
- Parameterisation with ASAM ODX
- Testautomation
- Advantages of this procedure
- Conclusion

Berner & Mattner Automotive

Our motto:

Model-based from the specification to HiL testing!

Our specialty:

Complete services for model-based specification, integration and test.

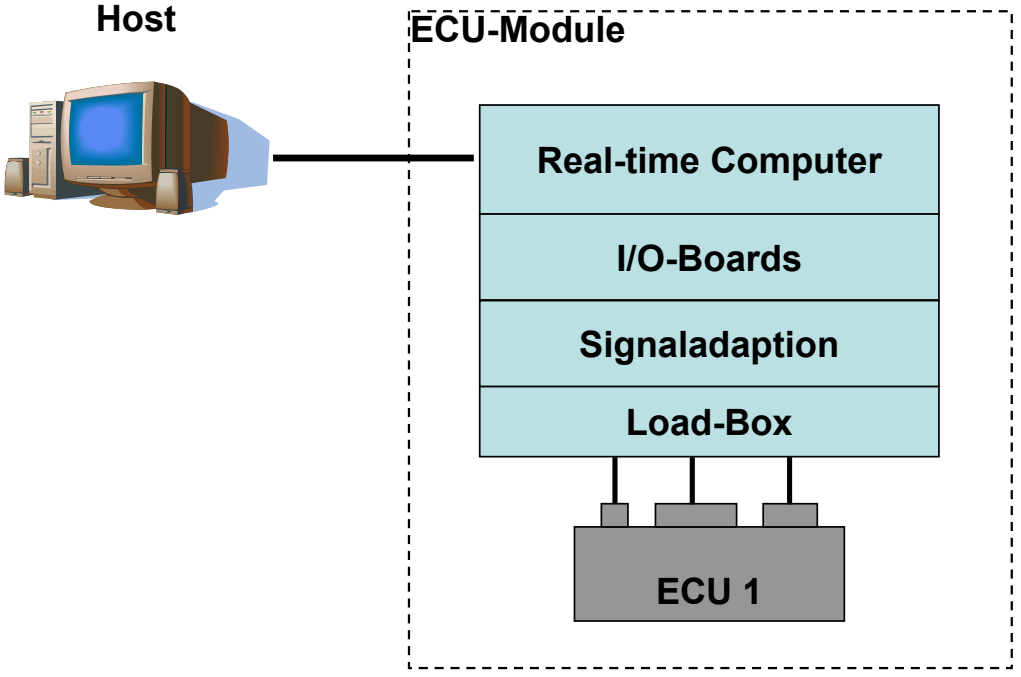
Our services:

Customized turn-key solution test systems including hardware, engineering, production, revamping and operation.

Our objective:

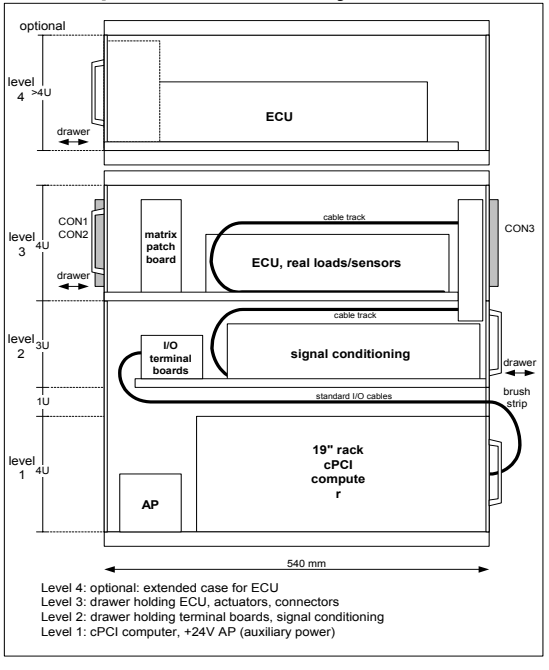
We optimize the quality and profitability of your development.

Hardware in the Loop (HiL)



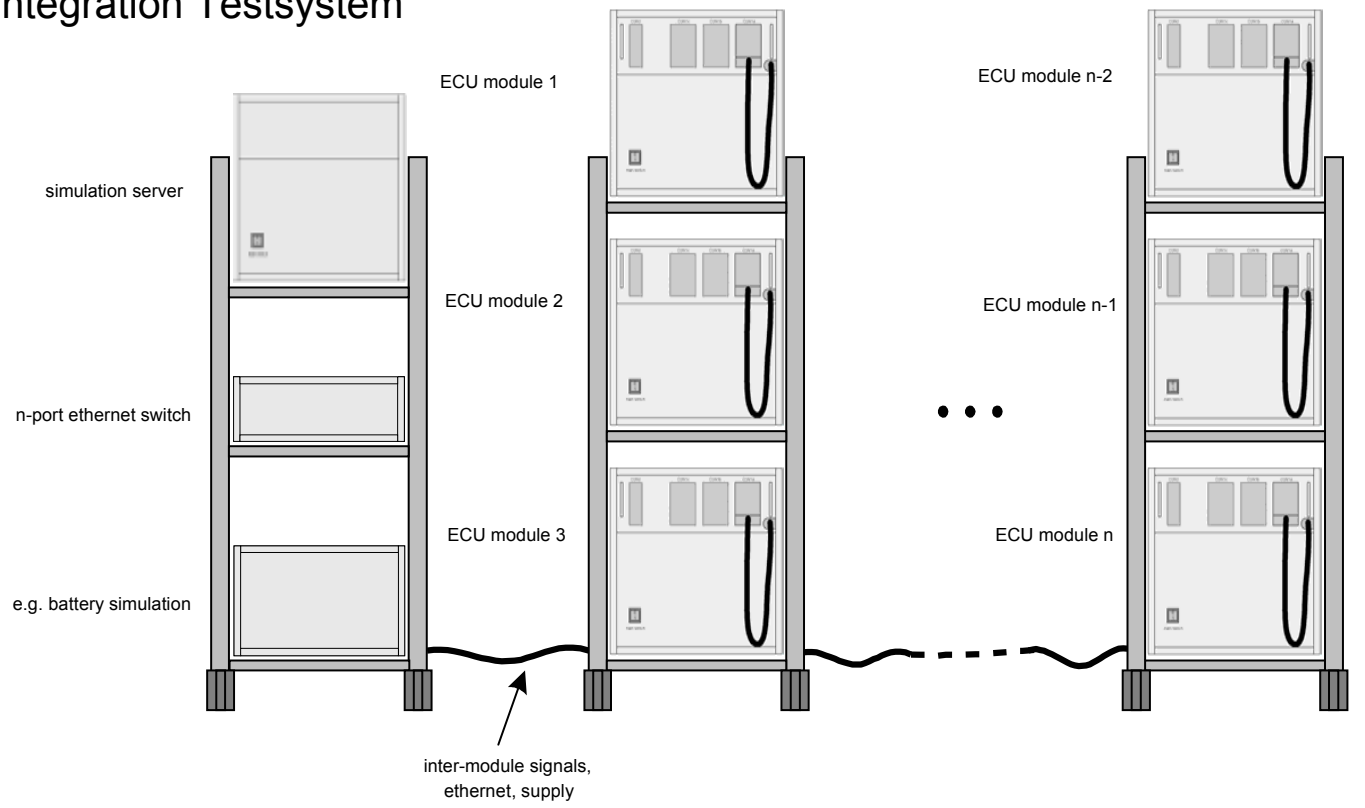
Hardware in the Loop (HiL)

Component Testsystem

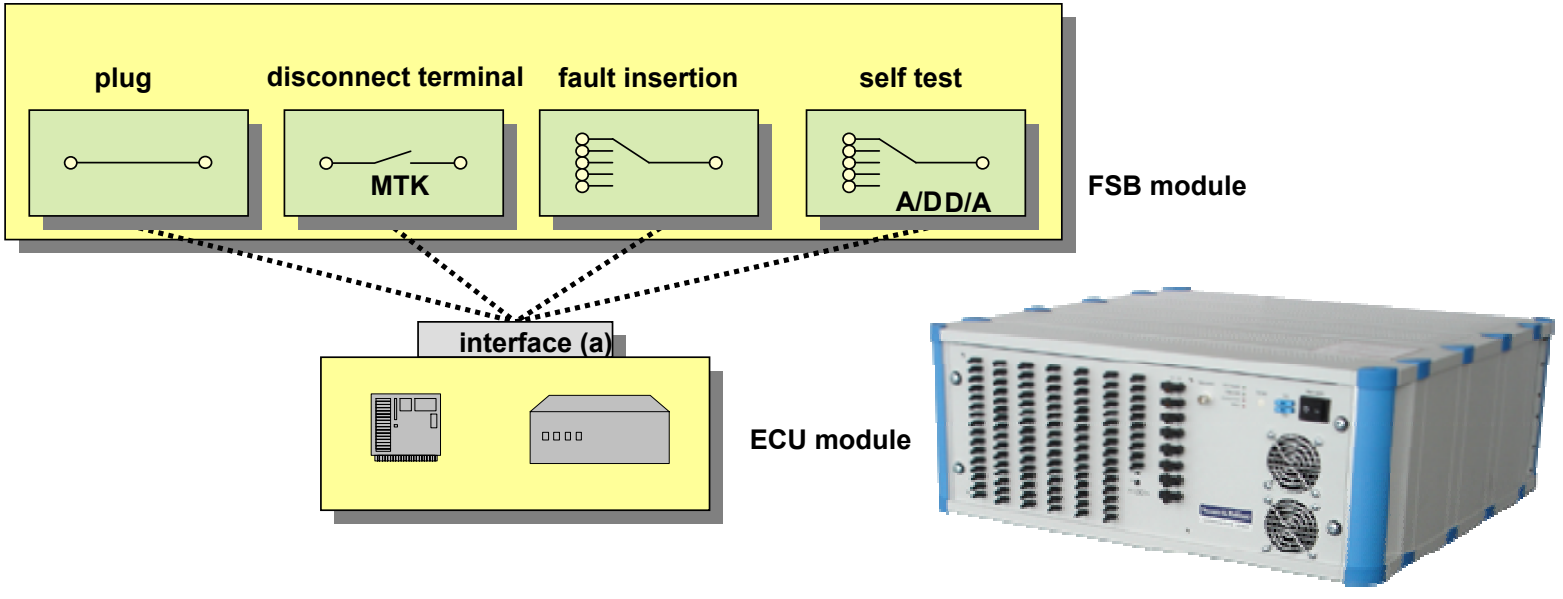


Hardware in the Loop (HiL)

Integration Testsystem



Hardware in the Loop (HiL)

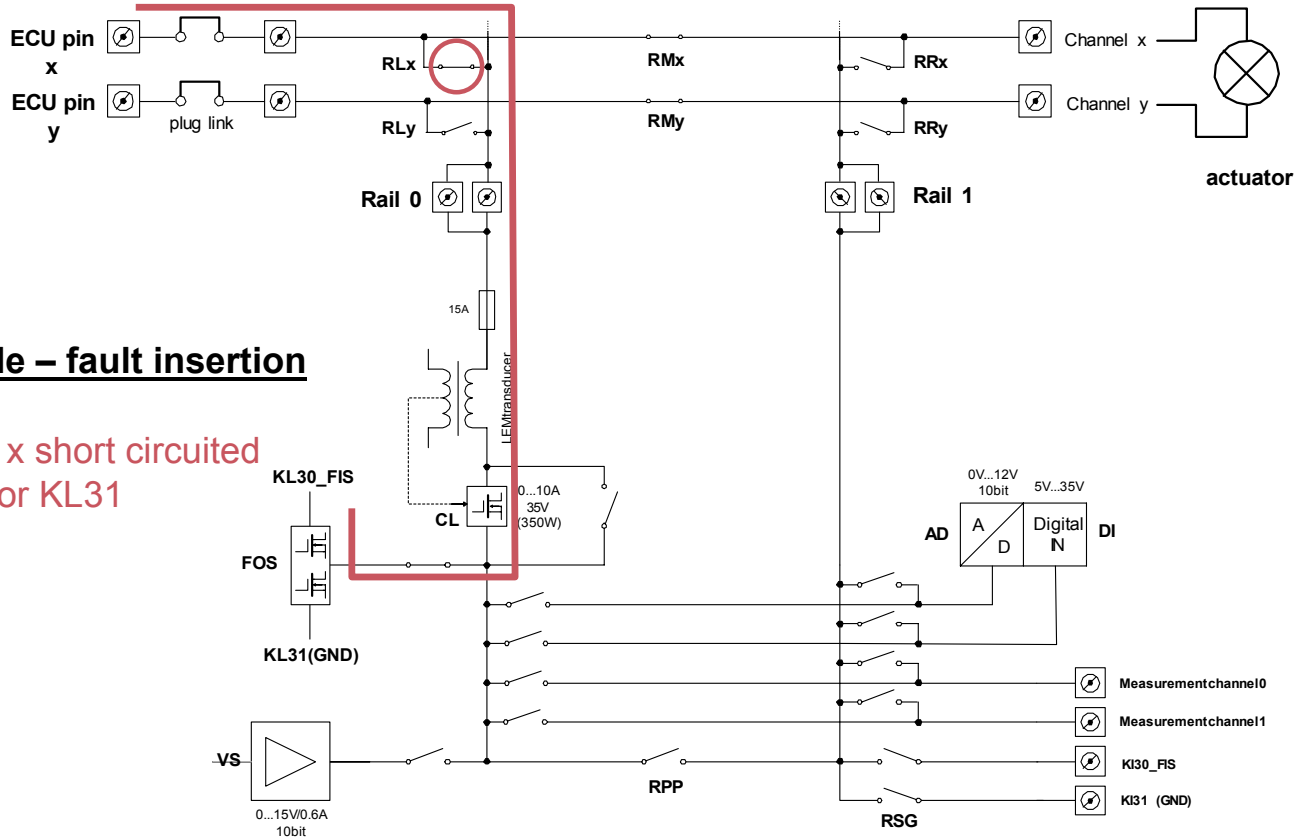


FSB – Breakout adapter with failure simulation
and system self-test capability

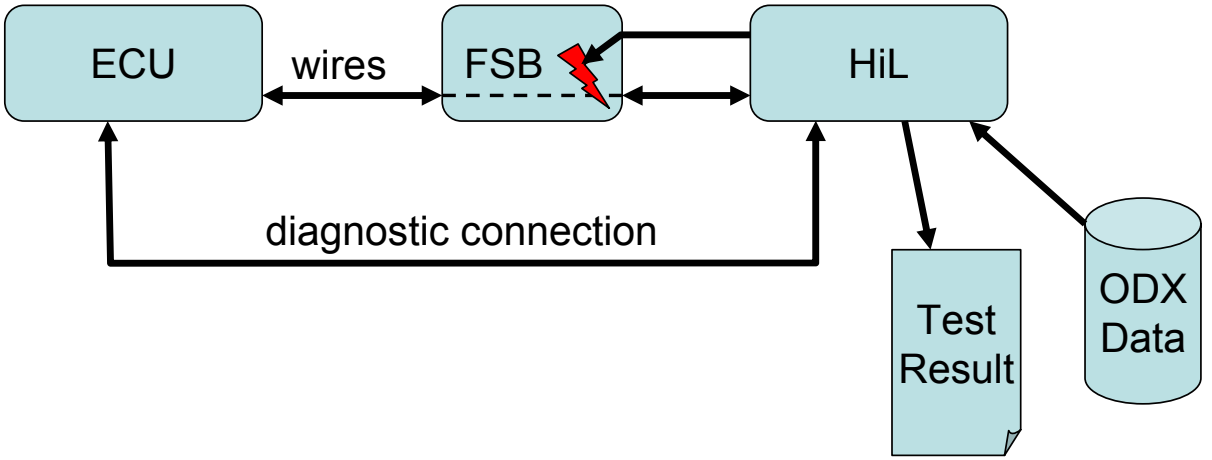
Hardware in the Loop (HiL)

FSB module – fault insertion

- ECU pin x short circuited to KL30 or KL31



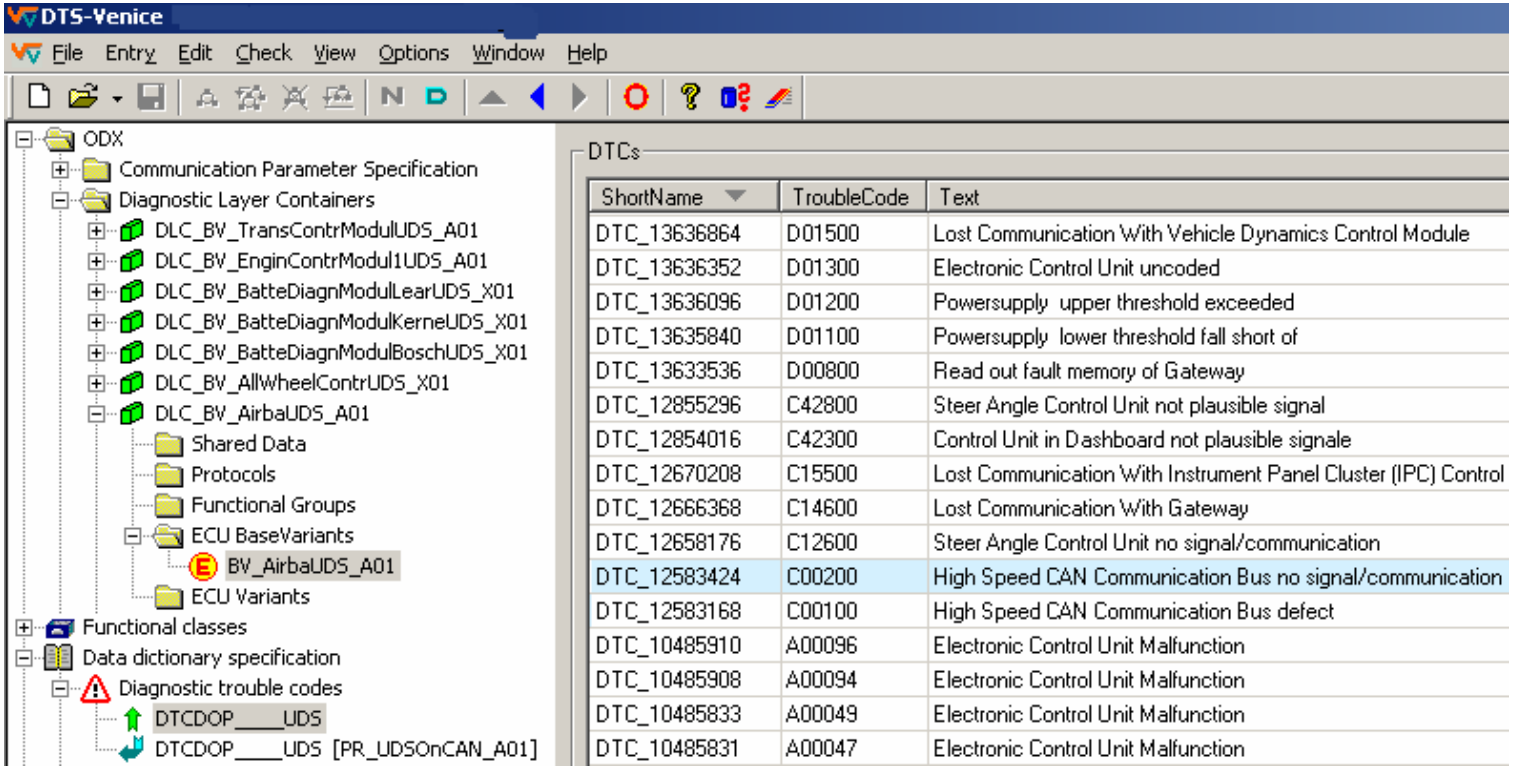
HiL Test System for DTC testing



DTC state

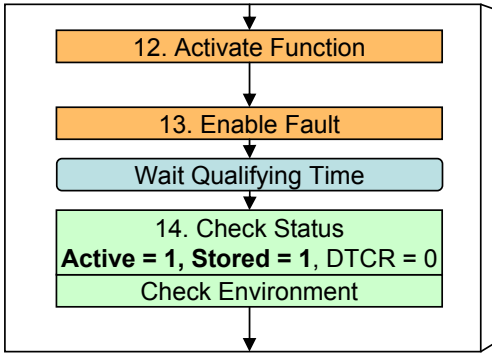
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
warning Indicator Requested	testNot Completed This Monitoring Cycle	testFailedSince LastClear	testNot Completed SinceLastClear → Readiness	confirmedDTC → stored	pendingDTC	testFailedThis Monitoring Cycle	testFailed → Active
1	0	1	0	1	0	0	1

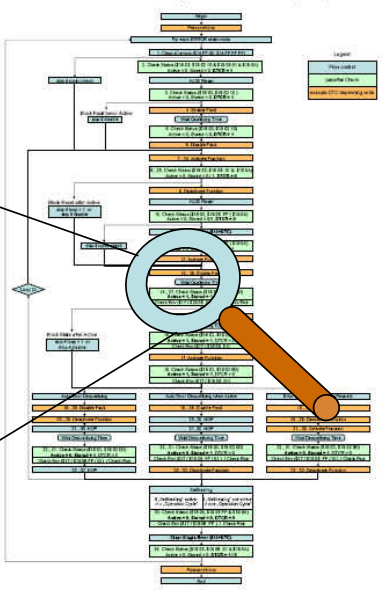
ASAM ODX Parameterization



ShortName	TroubleCode	Text
DTC_13636864	D01500	Lost Communication With Vehicle Dynamics Control Module
DTC_13636352	D01300	Electronic Control Unit uncoded
DTC_13636096	D01200	Powersupply upper threshold exceeded
DTC_13635840	D01100	Powersupply lower threshold fall short of
DTC_13633536	D00800	Read out fault memory of Gateway
DTC_12855296	C42800	Steer Angle Control Unit not plausible signal
DTC_12854016	C42300	Control Unit in Dashboard not plausible signale
DTC_12670208	C15500	Lost Communication With Instrument Panel Cluster (IPC) Control
DTC_12666368	C14600	Lost Communication With Gateway
DTC_12658176	C12600	Steer Angle Control Unit no signal/communication
DTC_12583424	C00200	High Speed CAN Communication Bus no signal/communication
DTC_12583168	C00100	High Speed CAN Communication Bus defect
DTC_10485910	A00096	Electronic Control Unit Malfunction
DTC_10485908	A00094	Electronic Control Unit Malfunction
DTC_10485833	A00049	Electronic Control Unit Malfunction
DTC_10485831	A00047	Electronic Control Unit Malfunction

Testautomation





```
12. Calling Activate Function ...
KL15: Radiostellung     -- PASS!
Blinkerschalter LINKS betätigt

13. Calling Enable Fault ...
Setze einen „Short to Ground"-Fehler
Leitung: DOOR.FL.Fahrtrichtungsanzeiger_MitteLinks
Wait 2,1 s (Qualifying Time)

14. Checks if error is active & stored
Protocol - Read DTC by Subfunction 2
Checks status of Error B985511: -- Pass
(Active =  1)(Stored =  1)(DTCR =  0)

Check Environment Data
Protocol Environment Data
 Frequency Counter: (value=1) Pass
 Operation Cycle Count: (value=0) Pass
 First ODO: (value=13520) Pass
 Current ODO: (value=13520) Pass
```

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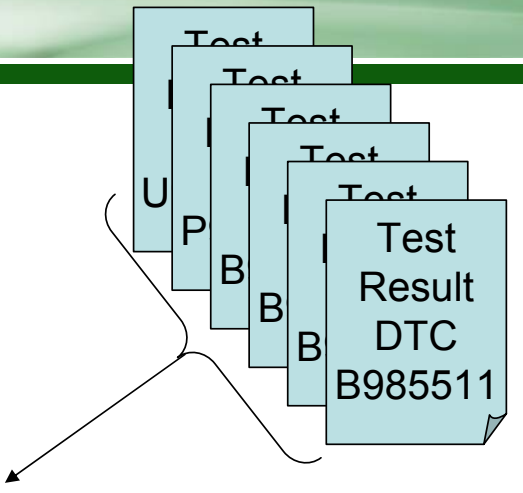
Testautomation



			Fehleranalyse			
DTC	**Beschreibung**	**Ergebnis**	**Vor Aktivierung A=0, S=0, R=1**	**Nach Aktivierung A=0, S=0, R=0**	**Fehler aktiv A=1, S=1, R=0**	**Fehler nicht aktiv A=0, S=1, R=0**
B210A00	Die Spannungsversorgung ist zu gering	fail	-		14. (A=0,S=0,R=0)	
B210B00	Die Spannungsversorgung ist zu hoch.	pass	-			
B985511	Spiegelblinker Leitungsunterbrechung	pass	-			
B220100	Ein interner Fehler im Modul ist vorhanden.	-	-	-	-	-
P021000	Die Steuergerätecodierung ist falsch.	-	-	-	-	-
U014000	CAN-Bus-OFF-Fehler	pass	-			

Benefits

- Standardized test sequences for all available electronic control units (ECUs)
- 100% reproducibility of future SW versions
- Complete coverage of all possible tests on a HiL testsystem
- High quality and significance of the DTCs for repair workshop purposes
- Transparency for the suppliers
- Full automated tests of 40 ECUs from one car model with about 1800 testcases possible within 90 hours

Conclusion

- Increase of customer satisfaction
- More confidence of the repair workshop staff in the DTS reliability
- Reduction of warranty costs

Vielen Dank für Ihre Aufmerksamkeit
Thank you for your attention

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